UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/679,260	10/07/2003	Cyrielle Cheng	0513-1080	3121

7590 12/30/2009

DYKEMA GOSSETT PLLC
39577 Woodward avenue, Suite 300
Bloomfield Hills, MI 48304

EXAMINER	
HOOK, JAMES F	

ART UNIT	PAPER NUMBER
3754	

MAIL DATE	DELIVERY MODE
12/30/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CYRIELLE CHENG and PIERRE MILHAS

Appeal 2009-005755
Application 10/679,260
Technology Center 3700

Decided: December 30, 2009

Before MELANIE L. MCCOLLUM, JEFFREY N. FREDMAN, and STEPHEN WALSH, *Administrative Patent Judges*.

WALSH, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 (2002) from a final rejection of claims 1-12. We have jurisdiction under 35 U.S.C. § 6(b) (2002). We affirm.

STATEMENT OF THE CASE

Appellants' claims are directed to a hose for conveying fluids containing hydrogen, e.g., gasoline, to a fuel cell onboard a motor vehicle to produce electricity to power the vehicle. (Spec. p. 2, ll. 1-10; App. Br. 1).

The hose comprises three hydrogen barrier layers: (a) an inner fluorine-based thermoplastic layer; (b) an intermediate vinyl ethylene alcohol layer (EVOH); and (c) a polybutylene terephthalate layer (PBT). (Spec. p. 2, ll. 8-14).

Claims 1 and 7 are the only independent claims in the application. Appellants do not raise separate arguments for the rejections of claims 1-6. We select independent claim 1 to decide the appeal regarding these rejections; claims 2-6 stand or fall with claim 1. See 37 C.F.R. § 41.37(c)(1)(vii)(2006).

Appellants separately argue claim 7 as the representative claim for the rejections of claims 7-12. Accordingly, claims 8-12 stand or fall with claim 7.

Claims 1 and 7 read as follows:

> 1. A hydrogen feeding hose for a fuel cell, the hose comprising three hydrogen barrier layers which are from the inside towards the outside:
>
> a layer comprising a fluorine-based thermoplastic material;
>
> a layer comprising a vinyl ethylene alcohol; and
>
> a layer comprising a polybutylene terephthalate.
>
> 7. A fuel cell assembly, comprising:
>
> a source of fuel, said fuel consisting of hydrogen;
>
> a fuel cell; and
>
> a hose transporting said fuel between said source and said fuel cell, said hose, comprising three hydrogen barrier layers which are from the inside towards the outside: a layer comprising a fluorine-based thermoplastic material; a layer comprising a vinyl ethylene alcohol; and a layer comprising a polybutylene terephthalate.

(App. Br. 17, Claims App'x.).

Figure 1 from the Application, reproduced below, illustrates one embodiment of the claimed hose. (Specification p. 3, ll. 6-7).

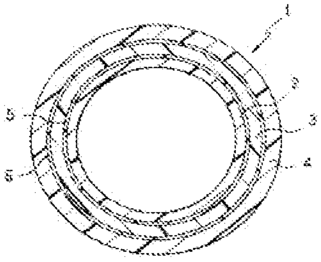

FIG. 1

{Figure 1 illustrates a hose in accordance with the present invention. (Id.).}

THE EVIDENCE

The Examiner relied upon the following as evidence in support of the rejections:

Kodama	5,937,911	Aug. 17, 1999
Nishino	6,089,278	Jul. 18, 2000
Ostrander	6,240,970 B1	Jun. 05, 2001
Hibino	2001/0006712 A1	Jul. 05, 2001
Blasko	2002/0134451A1	Sep. 26, 2002
Fukushi	2003/0087053 A1	May 08, 2003

THE REJECTIONS

The following rejections are before us for review:

1. Claims 1, 3 and 4 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Ostrander, Fukushi and Kodama.
2. Claim 2 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Ostrander, Fukushi, Kodama and Blasko.

3. Claims 5 and 6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Ostrander, Fukushi, Kodama and Nishino.

4. Claims 7-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Ostrander, Fukushi and Hibino.

5. Claims 7-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Hibino and Ostrander.

ISSUE

Have Appellants established that the Examiner erred in determining that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine known materials in a known manner for their known functions to form the hydrogen barrier layers of a fuel hose in the claimed arrangement?

FINDINGS OF FACT

1. Ostrander described a multi-layer fuel tube 10 comprising an inner layer 14, an intermediate bonding layer 16 and an outer layer 12. (Ostrander 3:12-13 with 5:42-45).

2. Ostrander's Figure 2 is reproduced below:

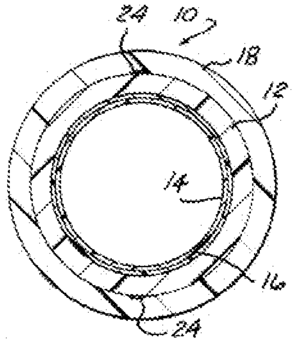

FIG-2

{Figure 2 shows a sectional view through a piece of tubing having three layers according to the present invention. (*Id.* 3:5-6).}

3. Ostrander described an embodiment of the hose in which the inner layer 14 may be comprised of thermoplastic material that is composed of a fluoroplastic material, including ethylene tetrafluoroethylene. (*Id.* 6:39-52).

4. Ostrander taught that the fluoroplastic material "employed in the inner layer 14 of the alternate embodiment is capable of serving as a hydrocarbon barrier to prevent significant permeation of the aromatic and aliphatic components of gasoline through to an alternate outer layer 12 composed of polyamide…." (*Id.* 7:1-5).

5. Ostrander also described an embodiment in which the intermediate bonding layer 16 may be comprised of a thermoplastic material such as ethylene vinyl alcohol (EVOH). (*Id.* 10:28-43).

6. Ostrander taught that this intermediate layer 16 "exhibits properties of resistance to permeation of aliphatic and aromatic materials such as those found in fuel." (*Id.* 9:11-14: 10:34-36).

7. Ostrander also taught that the intermediate layer 16 permits a homogenous bond between the inner layer 14 and the outer layer 12. (*Id.* 9:19-21).

8. Ostrander did not specifically describe an embodiment of the hose combining an inner fluoroplastic layer with an intermediate EVOH layer.

9. Ostrander also did not describe using polybutylene terepthalate (PBT) in the outer layer of the hose.

10. Fukushi described a multi-layer article for use with fuel systems, comprising an inner fluoroelastomer polymer layer 16 bonded to an

intermediate barrier layer 14 that is bonded to an outer non-fluorinated polymer layer. (Fukushi Abstract; [0006]; [0041]).

11. Fukushi taught that the fluoroelastomer can be a copolymer including tetrafluorethylene copolymer (TFE). (*Id.* [0022]).

12. Fukushi also taught that the barrier layer can include an ethylene vinyl alcohol copolymer (EVOH). (*Id.* [0039]).

13. Fukushi taught that the combination of the protective fluoroelastomer layer and the low fuel permeation of the EVOH barrier layer "provides improved permeation behavior than either material alone or the same materials in reverse order." (*Id.* [0010]).

14. Kodama described a fuel transporting hose having an inner fluorine layer "and an outer layer formed of a polyamide *or* polyester resin." (Kodama 7:25-28)(emphasis added).

15. Kodama taught that the polyester resin used to form the outer layer may be "polybutylene terephthalate (PBT)." (*Id.* 7:48-49).

16. We find Kodama taught that the outer layer of a multilayer fuel hose may alternatively be formed of *either* a polyamide or PBT. (FF 14-15).

17. Hibino described a multilayer fuel hose comprising an inner layer formed of a fluororesin and an outer layer formed of *either* polyamide, PBT or other materials. (Hibino [0028]-[0031]).

PRINCIPLES OF LAW

"If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability." *KSR International Co. v. Teleflex Inc.,* 550 U.S. 398, 417 (2007).

"A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." *In re Gurley* 27 F.3d 551, 553 (Fed. Cir. 1994).

ANALYSIS

I. The Rejection of Claims 1-6.

A. *The Examiner's Rejections*

The Examiner found that Ostrander described a hose for transporting fluid containing hydrogen except that Ostrander did not disclose (1) using ethylene vinyl alcohol (EVOH) in combination with a fluorine based thermoplastic material, and (2) forming the outer layer of polybutylene terephthalate (PBT). (Final Rejection, Oct. 29, 2007, p. 3). In particular, the Examiner found that Ostrander described embodiments comprising an inner layer formed of fluorine based thermoplastic material such as polyvinyl fluoride (PVDF) or ethylene tetrafluoroethylene (ETFE), as claimed, however such embodiments did not also comprise EVOH. (*Id.*). The Examiner also found that Ostrander described certain embodiments comprising an intermediate layer formed of EVOH, as claimed, but having an inner layer formed of polyamides rather than fluorine based thermoplastics. (*Id.*). Ostrander described each embodiment as having a polyamide outer layer. (*Id.*)

The Examiner found that Fukushi disclosed that it was known in the art at the time of the invention to form a multilayer fuel hose using an inner fluorine based thermoplastic layer in combination with an intermediate EVOH barrier layer to improve the barrier properties of the hose for better blocking permeation of gases. (*Id.*). According to the Examiner, it would have been obvious to one skilled in the art to modify the hose in Ostrander by combining its inner fluorine based thermoplastic layer in combination with an intermediate EVOH barrier layer, as taught by Fukushi, because using these layers was known in the art and Fukushi taught that this combination of the layers provides further barrier properties to protect against permeation of gases. (*Id.* 4).

Additionally, the Examiner found that Kodama described a multilayer hose for fuel transport comprising an inner layer that can be formed of a fluorine based thermoplastic material, and an outer layer that can be formed of either polyamides or a polyester resin such as PBT. (*Id.* 4). According to the Examiner, it would have been obvious for a person of ordinary skill in the art at the time the invention was made to substitute PBT for the polyamide in outer layer of Ostrander's assembly, as suggested by Kodama, because the materials were equivalent and used interchangeably. (*Id.*). The Examiner also found that "PBT would have certain beneficial qualities over the polyamide for use in specific environments and would provide different properties for use in different environments to make the hose more useful in a wider range [of] applications." (*Id.*).

B. *Appellants' Contentions*

Appellants challenge the Examiner's rationale for combining Ostrander and Fukushi by asserting that "[t]he tubing of Ostrander et al.

already serves to prevent or reduce the permeation of hydrocarbons therethrough, so there is no suggestion or motivation to change from an existing structure in Ostrander et al. that already accomplished the function." (App. Br. 8). Appellants further assert that "Ostrander et al. never contemplates the use of fluorinated thermoplastics in combination with EVOH…." (*Id.*). According to Appellants, "[b]y implicitly dismissing the combination of fluorinated thermoplastics with EVOH, Ostrander et al. teaches away from the inventive combination." (*Id.*).

These arguments are not persuasive. Ostrander described a multilayer fuel hose comprising an inner fluorine based thermoplastic layer. Ostrander also described another embodiment of the hose comprising an EVOH intermediate layer. Fukushi taught that combining an inner fluorine based thermoplastic layer with an EVOH intermediate barrier layer provides a multilayer fuel hose having "improved permeation behavior" which allows the hose to better block permeation of gases. (Fukushi [0010]). Therefore, the prior art provided express motivation for the Examiner's proposed combination, which merely amounts to combining known elements in a known manner to achieve a known result. *See KSR*, 550 U.S. at 417-418. The fact that Ostrander's hose assembly "already" provided a barrier to the permeation of gases does not establish that a skilled artisan at the time of the invention who reviewed Fukushi would not have been motivated to *improve* the permeation behavior of the hose. (*See* Fin. Rej. at 3.)

Further, we do not find that Ostrander teaches away from the proposed combination. "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." *Gurley*, 27 F.3d at 553; *see also In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004) ("The prior art's mere disclosure of more than one alternative does not constitute a teaching away from any of these alternatives because such disclosure does not criticize, discredit or otherwise discourage the solution claimed in the [] application."). Appellants find an implicit dismissal of a fluorinated thermoplastic-EVOH combination in Ostrander's purported failure to "contemplate" that particular combination. (App. Br. at 8.) We disagree. There is no evidence that the absence of a specific recitation of the fluorinated thermoplastic-EVOH combination included in Ostrander's group of combinations would have discouraged a skilled artisan from following Fukushi.

Appellants next challenge the Examiner's reliance on Kodama in the proposed combination by asserting that the Examiner failed (i) to provide sufficient evidence that the prior art recognized PBT and polyamide as equivalents and (ii) to identify the "beneficial qualities" that PBT has over polyamide that would lead one of ordinary skill to modify Ostrander. (App. Br. 9-10).

This argument is also unpersuasive. Kodama taught that the outer layer of a fuel hose may be formed of either a polyamide or PBT (Kodama 7:25-28; 7:48-49). That is, Kodama explicitly taught the substitution of PBT for a polyamide in forming the outer layer of a multilayer fuel hose. Kodama's teaching provided a skilled artisan sufficient motivation to substitute the polyamide in Ostrander's outer layer for PBT without further identification of beneficial or superior qualities of selecting PBT.

Nor are we persuaded by Appellants' assertion that "the substitution of PBT for the layer adjacent the EVOH layer was not merely predictable such that one of ordinary skill in the art would have simply substituted PBT for the outer layer, especially considering that there are no references that disclose the combination." (Reply Br. 1). This contention is merely attorney argument and not persuasive evidence. We have already found that the Examiner provided sound reasoning for forming Ostrander's outer layer with PBT instead of polyamide, based upon the substitution teaching of Kodama. Appellants have not provided any persuasive evidence to establish that Ostrander's EVOH intermediate layer would have rendered the substitution teaching inapplicable.

II. The Rejection of Claims 7-12.

A. *Ostrander, Fukushi and Hibino*

The Examiner found that Hibino described a multilayer hose for fuel transport, comprising an inner layer 2 which can be made of various fluororesins, PVDF or ETFE and an outer layer 4 (outside of the inner layer) that can be formed of polyamides or a polyester resin including PBT or various other materials. (Final Rejection, p. 6). According to the Examiner, it would have been obvious to a person of ordinary skill in the art at the time of the invention to substitute PBT for the polyamide in the outer layer of Ostrander, as suggested by Hibino, because the two materials were equivalents and were used interchangeably. (*Id.*). Additionally, the Examiner found that PBT would provide beneficial qualities over the polyamide for use in specific environments and would provide different properties for use in different environments to make the hose more useful for a wider range or applications. (*Id.*).

Appellants repeat their arguments that a skilled artisan would not be motivated to combine Ostrander and Fukushi, and that the Examiner failed to provide sufficient evidence that the prior art recognized PBT and polyamide as equivalents and failed to identify the "beneficial qualities" that PBT has over polyamide and why they would lead one of ordinary skill to modify Ostrander. (App. Br. 13-14). We are not persuaded by these arguments for the reasons already discussed.

Like Kodama, Hibino taught a multilayer fuel hose having an outer layer that may be formed of materials including either a polyamide or PBT. (Hibino [0031]). Like Kodama, Hibino taught the substitution of PBT for polyamide in forming the outer layer of a multilayer fuel hose. As before, that teaching provided sufficient motivation to a skilled artisan for the Examiner's proposed substitution in Ostrander. Consequently, we do not find that the Appellants have established that the Examiner erred in combining the teachings of the prior art to reject the claims.

B. *Hibino and Ostrander*

The Appellants also challenge the Examiner's rejection of claims 7-12 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Hibino and Ostrander. The Examiner found that Hibino disclosed all of the recited fuel assembly structure, except for (a) using EVOH as the intermediate barrier layer, (b) using PVF as one of the fluororesins in the inner layer, and (c) providing a polyurethane adhesive layer. (Final Rejection, p. 7). According to the Examiner, it would have been obvious to a skilled artisan at the time of the invention to modify the intermediate barrier layer of Hibino by substituting EVOH, because EVOH "is another known equivalent intermediate barrier layer used in combination with fluororesins and PBT in fuel hoses...." (*Id.*). The Examiner also determined that using PVF as the inner fluororesin would have been obvious because (1) it was a known equivalent to Hibino's ETFE and (2) Hibino's PVDF was a form of PVF. (*Id.*). Additionally, the Examiner found that it would have been obvious "to provide a polyurethane bonding layer to connect the layers together thereby forming an adhesive layer as suggest[ed] by Ostrander" because doing so would have resulted in a more flexible hose and would have ensured that the layers remain connected together so as to prevent premature failure and to avoid replacement costs. (*Id.*).

Appellants challenge the rejection by asserting that "one of ordinary skill in the art would not be motivated to modify Hibino et al. to remove the metal barrier layer and replace it with an EVOH layer," because Hibino disclosed that a metal barrier layer was "an essential feature of the hose" to ensure that the hose had "a high fluid impermeability." (App. Br. 15-16). According to Appellants, Hibino taught that organic materials may not be able to provide such impermeability and that such materials may be expensive and undesirable. (*Id.*). Therefore, Appellants assert that Hibino taught away from any combination that would include a non-metal barrier layer by criticizing or discrediting the use of non-metal barrier layers in multi-layer hoses. (*Id*).

We agree with Appellants that the Examiner has not established that it would have been obvious for a person of ordinary skill in the art at the time the invention was made to modify Hibino by substituting Ostrander's EVOH for the metal film in Hibino's intermediate barrier layer. In particular, the

Examiner has not provided some objective teaching in the prior art or evidence of ordinary skill in the art that EVOH and metal were "known equivalents" with regard to materials comprising barrier layers for hoses. (*See* Ans. 7). To the contrary, Hibino expressly distinguished hoses comprising metal from those formed solely of organic materials by stating that the latter "may not be able to satisfy the future requirement for fluid impermeability." (Hibino at [0005]). Further, we are not convinced that the Examiner's proposed modification would have been obvious in view of Ostrander's teaching that the intermediate layer may include certain metals such as stainless steel, copper, etc. (*See* Ans. 19; Ostrander 9:11-31). Ostrander disclosed including such conductive material in an amount sufficient to render the intermediate layer electrostatically dissipative in a range of 10^4 to 10^9 Ohm/cm^2, rather than forming the metal as a film to impart fluid impermeability, as taught by Hibino. (Ostrander 9:23-25; Hibino [0026], [0029]). Consequently, we conclude that the Examiner erred in rejecting claims 7-12 over a combination of Hibino and Ostrander.

CONCLUSION OF LAW

On the record before us, the Appellants have not shown error in the Examiner's conclusion that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the various materials disclosed by Ostrander, Fukushi, Kodama, Blasko and Nishino in a known manner for their known functions to form layers of a fuel hose in the claimed arrangement.

However, we find the Examiner did not provide evidence that EVOH and metal were "known equivalents" with regard to materials comprising barrier layers for hoses, and we conclude that the rejection over Hibino and Ostrander must be reversed.

DECISION

The Rejection of claims 1, 3 and 4 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Ostrander, Fukushi and Kodama is AFFIRMED.

The Rejection of claim 2 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Ostrander, Fukushi, Kodama and Blasko is AFFIRMED.

The Rejection of claims 5 and 6 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Ostrander, Fukushi, Kodama and Nishino is AFFIRMED.

The Rejection of claims 7-12 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Ostrander, Fukushi and Hibino is AFFIRMED.

The Rejection of claims 7-12 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Hibino and Ostrander is REVERSED.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2006).

AFFIRMED

lp

DYKEMA GOSSETT PLLC
39577 WOODWARD AVENUE, SUITE 300
BLOOMFIELD HILLS MI 48304